



USN

BME303

Third Semester B.E./B.Tech. Degree Examination, June/July 2025

Material Science and Engineering

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.**2. M: Marks, L: Bloom's level, C: Course outcomes.*

Module – 1			M	L	C
Q.1	a.	Explain classification of materials. Compare crystalline solids and non crystalline solids.	10	L2	CO1
	b.	Define (i) Crystal lattice (ii) Unit cell (iii) Planar atomic density (iv) Coordination number (v) Atomic packing factor.	10	L1	CO1
OR					
Q.2	a.	Derive atomic packing factor for simple cubic structure.	10	L2	CO1
	b.	Explain edge and screw dislocations.	10	L2	CO1
Module – 2					
Q.3	a.	State and explain HumeRothery rules.	10	L1	CO2
	b.	Explain Fick's laws of diffusion.	10	L2	CO2
OR					
Q.4	a.	Explain iron-carbon diagram with a sketch.	10	L2	CO2
	b.	Two metals A and B are used to form an alloy containing 75% A and 25% B. A melts at 650°C and B at 450°C. The solid solubility of metal A in B and of B in A are negligible. The metal pair forms an eutectic at 40% A and 60% B which solidifies at 300°C. Assume liquids and solidus lines are straight draw phase diagram for the alloy series.	10	L3	CO2
Module – 3					
Q.5	a.	Explain (i) Annealing (ii) Normalizing (iii) Hardening (iv) Tempering (v) Nitriding.	10	L1	CO3
	b.	Explain with sketch Jomine End Quench test.	10	L2	CO3
OR					
Q.6	a.	Explain with a neat sketch flame hardening.	10	L2	CO3
	b.	Explain with a graph T-T-T diagram.	10	L2	CO3
Module – 4					
Q.7	a.	With a neat sketch explain physical vapours deposition.	10	L2	CO4
	b.	Write advantages and disadvantages of surface coating.	10	L2	CO4
OR					
Q.8	a.	Explain different powder production techniques in mechanical methods.	10	L2	CO4
	b.	Explain the functions of lubricants and binders in powder metallurgy.	10	L2	CO4
Module – 5					
Q.9	a.	State properties, composition and uses of low, medium and high carbon steels.	10	L2	CO5
	b.	Explain with sketch hand-layup process.	10	L2	CO5
OR					
Q.10	a.	Briefly explain the selection criteria for selection of materials.	10	L2	CO5
	b.	With a sketch explain filament winding process.	10	L2	CO5
